J Raptor Res. 33(4):317–322

TWENTY YEAR CHANGE IN THE RAPTOR COMMUNITY IN NORTHERN UTAH DURING THE NONBREEDING SEASON

PHILLIP BROUSE
Fisheries and Wildlife, BNR 206, Utah State University, Logan, UT 84322-5210 U.S.A.

ABSTRACT.—Winter roadside surveys were conducted to count wintering raptors in Cache Valley, Utah. The study design allowed comparisons in distribution and species composition over the past 20 yr. Even though an increase in abundance was observed for American Kestrels (*Falco sparverius*), Merlins (*F. columbarius*), Bald Eagles (*Haliaeetus leucocephalus*) and Ferruginous Hawks (*Buteo regalis*), an overall decline was evident. Raptor numbers for the winter of 1997–98 were 61% of those reported for the winters of 1976–79. Despite changes in abundance and a change in geographic distribution, the temporal distribution remained the same. Raptor numbers were highest in irrigated pastures, followed closely by dry cropland. Numbers increased slightly from December–January, were lowest during February and rose steadily again through April.

KEY WORDS: *winter; raptor; roadside survey; Utah; abundance.*

Veinte años de cambio en la comunidad de rapaces del norte de Utah durante la estacion sin reproduccion

RESUMEN.—los Monitoreos de carretera fueron llevados a cabo para contabilizar rapaces durante el invierno en el Valle de Cache, Utah. El diseño del estudio permitió las comparaciones entre la distribución y la composición de especies en los últimos 20 años. Aunque se observó un aumento en la abundancia de *Falco sparverius, Falco columbarius, Haliaeetus leucocephalus* y *Buteo regalis,* un descenso se hizo evidente. Las cifras de rapaces para el invierno 1997–98 fueron 61% de aquellas reportadas por los inviernos de 1976–79. A pesar de los cambios en abundancia y los cambios en la distribución geográfica, la distribución temporal fue la misma. Los números de rapaces fueron mayores en pastizales irrigados seguidos de cerca por los cultivos en tierras secas. Las cifras se incrementaron levemente de Diciembre–Enero y fueron mas bajas en Febrero aumentando paulatinamente a traves de Abril.
[Traducción de César Márquez]

Over the period of November 1976–March 1979, winter roadside counts were conducted to determine relative abundance, distribution and habitat use of raptors during the nonbreeding season in Cache Valley, Utah (Gessaman 1982). In the 20 yr since, both land use and the human population have changed. Winter raptor species composition and overall numbers have also changed. This study provides current data and a comparison of species composition and habitat changes that have occurred during the past two decades.

STUDY AREA

Cache Valley is located in northern Utah and southern Idaho. Its west boundaries are the Wellsville Mountains and the south and east boundaries are the Bear River Mountains. The northern border of the study area is the Utah-Idaho boundary. The average elevation is 1341 m and the land area surveyed was 68 088 ha.

METHODS

Where possible, the methods were consistent with those used by Gessaman (1982). The study area was divided into eight census areas which were surveyed once a month from December 1997–April 1998. Each census of all eight areas was completed within an 8-d period. Surveys were made by driving all accessible rural roads and randomly selected residential roads at speeds of less than 43 km/hr. Surveys were carried out in all types of weather where visibility was suitable. Each survey team consisted of a driver and up to three observers. At least one team member was proficient at raptor identification and the teams had field guides and binoculars on hand. Only raptors that were close enough to see with the unaided eye were counted.

Information recorded included species, habitat, sex, age, color morph or subspecies, map location, activity and perch type and height. The date, start and stop time, distance traveled, sky condition, air temperature, wind speed and snow depth were also noted for each survey. All sightings were also marked on a reusable laminated map of the area and transferred to overhead transparencies. Habitat was divided into the following types: ur-

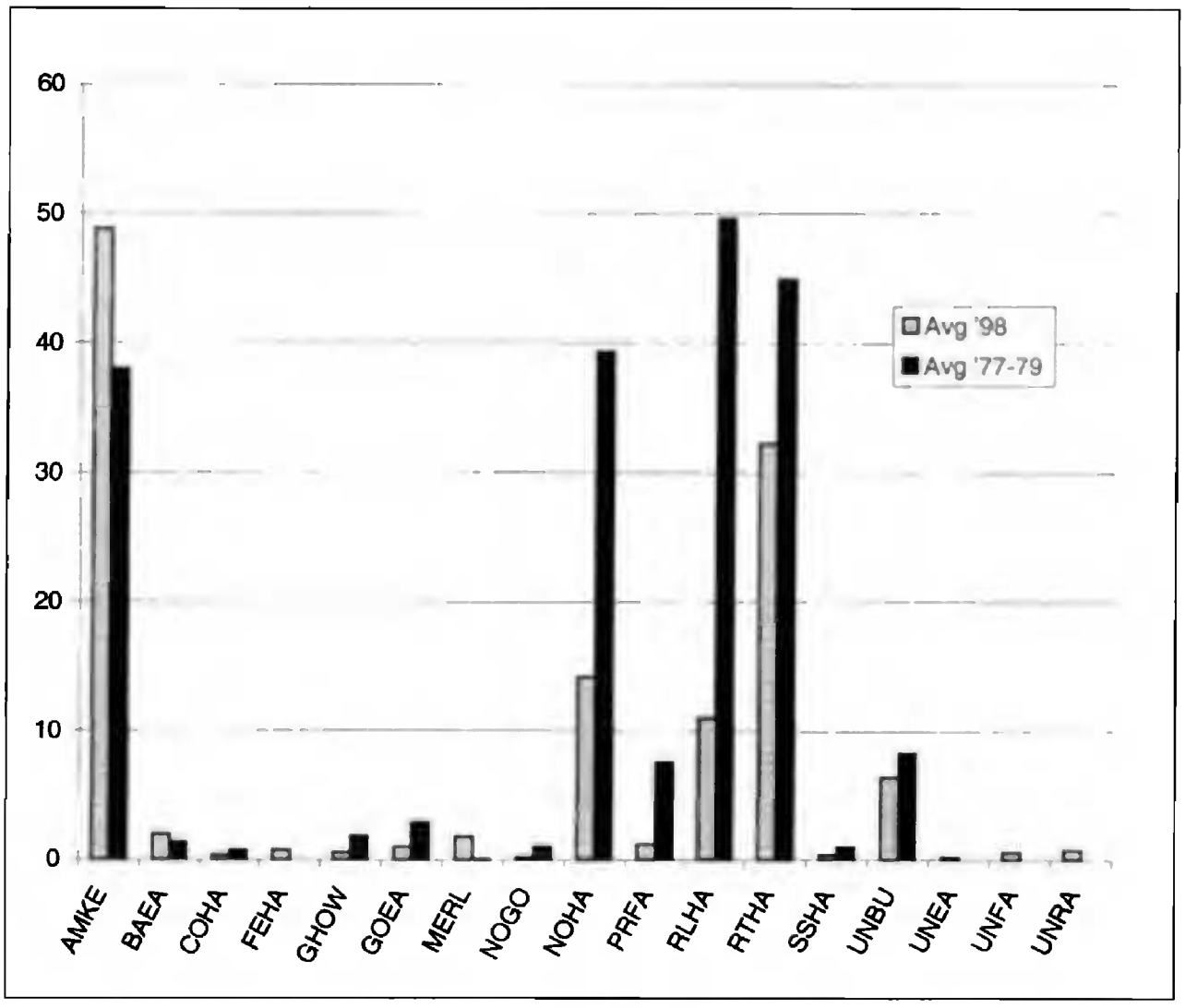

Figure 1. The average number of species of raptors observed in northern Utah in the nonbreeding season in 1977–79 and 1998.

ban, marsh, river floodplain, dry cropland, irrigated pasture/hay land, open water, native grassland and rural residential.

A relative abundance index was computed as described by Woffinden and Murphy (1977) as follows:

$$\frac{\text{Number of species observed}}{\text{Number of km traveled}} \times 1000$$

This is compatible with Gessaman (1982), who reported in units of observations per 1000 km.

RESULTS AND DISCUSSION

A total of 16 species was observed throughout the survey. Of these, three are summer residents and were observed only in April. Gessaman (1982) observed 18 species, one of which, the Harris's Hawk (*Parabuteo unicinctus*), was not native to Utah and probably escaped from a falconer. In all, 677 raptors were observed over the 4061 km driven. The overall relative abundance was 166.7, as compared to 272 reported by Gessaman. The average number of observations per survey was 135.4 (Fig. 1). Gessaman reported a considerably higher average of 221.25 per survey. Both the overall relative abundance and the average observations per survey for this study were 61% of Gessaman's observations. Both studies showed a similar temporal distribution with raptor numbers lowest in February (Fig. 2).

Mating behavior was noted as early as the second week in February for both American Kestrels (*Falco sparverius*) and Northern Harriers (*Circus cyaneus*). Red-tailed Hawks (*Buteo jamaicencis*) were not observed mating until April. Swainson's Hawks (*B. swainsoni*) had not yet returned during the mid-March survey, but were already nesting by the mid-April survey.

The winter of 1997–98 was an El Niño winter; however, the effects of El Niño on local migration patterns were not determined. It should be noted, however, that the winter of 1977–78 was also an El Niño winter.

For comparison, weather data were obtained from the Utah Climate Center at Utah State University for both study periods. The mean daily high temperatures for each month surveyed were similar for both studies with the exception of January (Fig. 3). The overall average number of days with

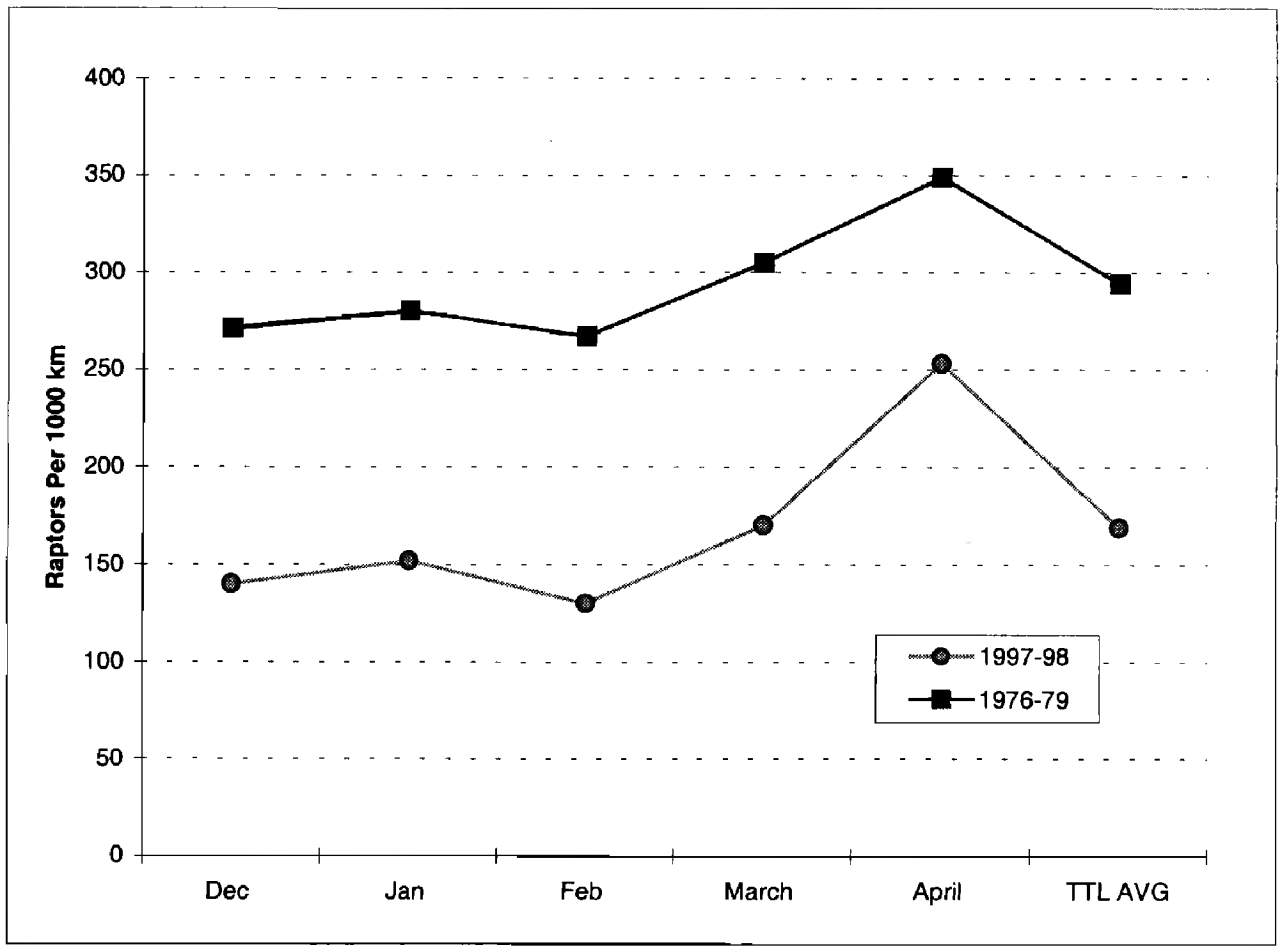

Figure 2. Monthly variation in raptor abundance in northern Utah during the nonbreeding season in 1976–79 and 1997–98.

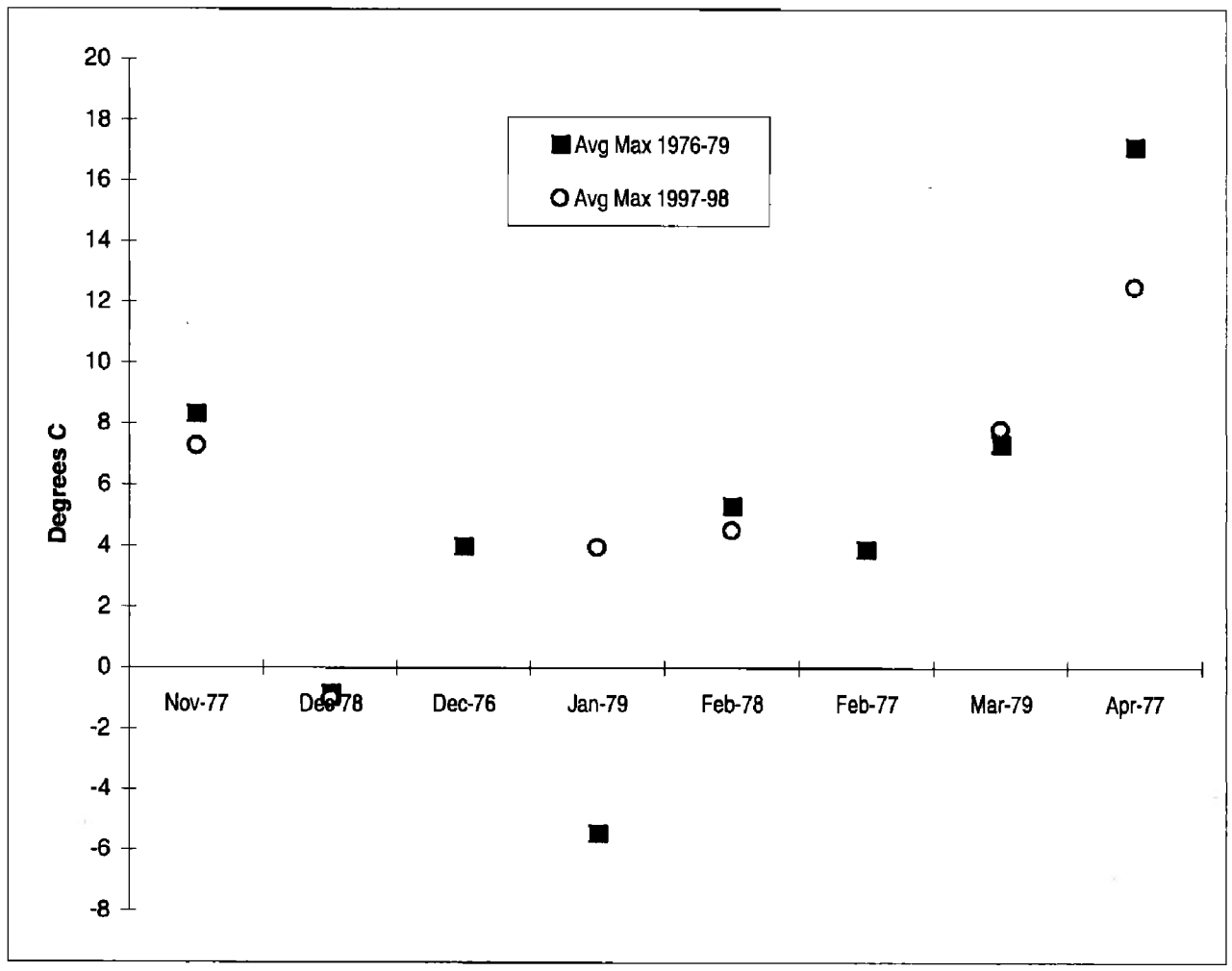

Figure 3. Mean daily high temperatures in northern Utah in 1976–79 and 1997–98.

Table 1. A comparison of observations of raptors in northern Utah in 1976–79 and 1998–99, excluding summer residents observed in April.

SPECIES	PER 1000 km		MEAN BIRDS PER CENSUS	
	1976–79	1998–99	1976–79	1998–99
American Kestrel	46.9	60.0	38.0	48.8
Bald Eagle	1.7	2.5	1.4	2.0
Cooper's Hawk	1.0	0.5	0.8	0.4
Ferruginous Hawk	0.0	1.0	0.0	0.8
Great Horned Owl	2.3	0.7	1.9	0.6
Golden Eagle	3.6	1.2	2.9	1.0
Merlin	0.9	2.2	0.7	1.8
Northern Goshawk	1.2	0.3	1.0	0.2
Northern Harrier	48.5	17.5	39.3	14.2
Prairie Falcon	9.4	1.5	7.6	1.2
Rough-legged Hawk	62.1	13.5	49.6	11.0
Red-tailed Hawk	55.4	39.6	44.9	32.2
Sharp-shinned Hawk	1.2	0.5	1.0	0.4
Short-eared Owl	5.8	0.0	4.7	0.0
Unidentified buteo	21.9	7.9	17.7	6.4
Unidentified eagle	0.0	0.3	0.0	0.2
Unidentified falcon	0.0	0.7	0.0	0.6
Unidentified raptor	0.0	1.0	0.0	0.8
Totals	261.9	150.8	211.5	122.6

snow cover for the months surveyed by Gessaman was 12, while this study had an average of 14. The average number of days with snow cover per month was also similar, with the greatest difference (7 d) also being in January. Snow depth varied tremendously within the years surveyed by Gessaman. The winter of 1976–77 was close to average between the other two years and is similar to the winter of 1997–98. The 1976–79 averages ranged from 0.7–10.1 cm with a mean of 4.8 cm; the average snow depth for 1997–98 was 4.1 cm.

Most changes in habitat resulted from urban development on and below the benches along the eastern edge of the valley (areas three and eight). The development of industrial areas and the construction of apartments and low-income housing occurred within the valley on the western side of Logan (area six). In 1980, there was an estimated 18 864 housing units (U.S. Census Bureau 1996). This estimate increased to 27 595 units by 1997 (County-Wide Planning & Development Office 1998). The resident population increased from 52 423 in 1977 (U.S. Census Bureau 1996) to 87 907 in 1997 (County-Wide Planning & Development Office 1998). While total farmland decreased from 118 990 ha in 1978 to 108 427 ha in 1992, irrigated land remained similar (up from 35 256 ha to 35 401 ha), and dry cropland increased from 70 027 to 70 847 ha in the same period. The total amount of farmland in 1987 was 38.5% and in 1992 was 36% (U.S. Census Bureau 1996).

In Gessaman's earlier study, the four most abundant species, Rough-legged Hawk (*B. lagopus*), Red-tailed Hawk, American Kestrel and Northern Harrier, had the highest densities in areas five, six and seven, although they were present in all census areas. While the same four species were the most abundant in this study (Table 1), they are distributed differently. Rough-legged Hawks were most abundant in areas one and six and absent from area three. Red-tailed Hawks were most abundant in areas four, six and seven, American Kestrels in areas two, six and seven, and Northern Harriers in areas one, five and six. Distribution for these species was not random over habitat types. Irrigated pasture was the most frequently used habitat, while dry cropland was the second most frequently used for all four species. The lack of Rough-legged Hawks in urban and suburban areas was consistent with the findings of Fischer et al. (1984) for central Utah.

Four species increased in relative abundance since Gessaman's study. American Kestrels in-

creased from 46.9 to 60, Merlins (*F. columbarius*) from 0.9 to 2.2, Bald Eagles (*Haliaeetus leucocephalus*) from 1.7 to 2.5 and Ferruginous Hawks (*B. regalis*) from 0 to 1.0.

Among the buteos, the abundance of Rough-legged Hawks declined to 22% of the numbers reported by Gessaman. The 55 observations of this species accounted for 8% of all observations. Numbers were highest in January for both studies. Only one dark morph individual was seen, compared to 23 of 99 individuals observed by Gessaman.

A total of 161 Red-tailed Hawks was counted, accounting for 24% of all observations and constituting 72% of the numbers given for 1976–78. Gessaman reported that, of those identified to color, 22 were dark morphs and 116 were light morphs. During this study, 116 western light, six dark, nine rufous, three Harlen's and one Krider's morph Red-tailed Hawks were observed. One partial albino was also seen. The color was not recorded for 25 of the Red-tailed Hawks observed.

Seventy-one Northern Harriers were observed, with an average of 14.2 observations per census. Gessaman had an average of 39.3 Northern Harriers per census. Harriers were distributed more frequently over irrigated fields, then dry cropland, followed by marshland. However, marshland was usually nearby or interspersed with the other habitat type.

With a total of 244 observations, American Kestrels accounted for 36% of all observations and were the most numerous raptor. Of the observations where sex could be determined, 56% were male and 44% were female. My study found the greatest numbers in December with a steady decrease through March, for winter populations. Gessaman found the lowest numbers in December with a steady increase through March. The April numbers increased dramatically for both studies. My study saw numbers almost double from March–April, while Gessaman found that numbers more than quadrupled over the same two months. The kestrel was the only species to be frequently found in rural residential habitats, where it had its third highest frequency. The highest frequency was in irrigated pastures and the second was in dry cropland.

Nine Merlins were observed during the study, being absent only from areas one and three, both of which were on the edge of the valley. One Merlin was seen below a dam in an open riparian area with many snags, one in a rural residential area and the others on pasture or cropland. Although *F. c. suckleyi* was not observed, both *F. c. richardsoni* and *columbarius* were. All three subspecies are known to winter in central Utah (Haney 1997).

Prairie Falcons (*F. mexicanus*) were observed at only 16% of the abundance reported in the earlier study. Six individuals were sighted, all of which were seen in December and January. Gessaman reported seeing them throughout the winter with the highest numbers in February.

Ten Bald Eagles, two of which were subadults, were observed. Six observations were known to be the same pair counted in three subsequent months. Bald Eagles were found near streams in open fields, even though Cache Valley's three reservoirs provided abundant open water and below-dam habitat. By comparison, Brown (1996) found that 88% of wintering Bald Eagles in Piedmont North and South Carolina were associated with below-dam habitats during the winter, instead of along rivers or near reservoirs. Five Golden Eagles (*Aquila chrysaetos*) were observed. Of these, four observations were known to be of the same pair.

One Northern Goshawk (*Accipiter gentilis*) was counted. Cooper's Hawks (*A. cooperii*) and Sharp-shinned Hawks (*A. striatus*) both showed a decline, although accipiters were rare in both studies. Due to the survey design, areas with trees (urban and riparian habitats) were not surveyed as completely, thus all of the accipiters may not have been counted.

Short-eared Owls (*Asio flammeus*) were not observed during this study. Gessaman reported an abundance index of 5.8 with an average of 4.7 seen per survey. While casual observations indicated a local population crash in 1992, no data has been collected on this species for Cache Valley. This difference may have been due to chance encounters with groups of owls.

While the human population has risen and habitat has been lost, it is important not to assume a correlation between lower raptor numbers and increased human activity. The data may in part be the result of loss of habitat, but, as previously pointed out, most human growth has taken place in concentrated areas rather than in large portions of the study area. In most of the census areas, habitat remained as it was 20 years ago, leading me to believe that other factors, perhaps on the breeding grounds, have attributed to the decline.

ACKNOWLEDGMENTS

I thank J. DeLong, D. Neff, J. Neyme, S. Duffner, J. Stiver, K. Klein, K. Olson and T. Pearl for helping run surveys. D. Roberts deserves much thanks not only for running surveys each month, but for helpful suggestions in the design of the study. I am grateful to J. Gessaman for information pertaining to his study and reviewing the final draft of this paper. I am especially grateful to J. Parrish for suggesting this project and for reviewing my initial study design and final draft. Thanks should also go to C. White for encouragement and guidance. Most of all, I thank my wife, K.D. Brouse for her editing skills, patience, support and help running surveys.

LITERATURE CITED

BROWN, R.D. 1996. Attraction of Bald Eagles to habitats just below dams in Piedmont North and South Carolina. Pages 299–306 *in* [EDS.], Raptors in human landscapes. Academic Press, London, U.K.

COUNTY-WIDE PLANNING & DEVELOPMENT OFFICE. 1998. Annual report of socio-economic characteristics, 1997 preliminary supplement. Logan, UT U.S.A.

FISCHER, D.L., K.L. ELLIS AND R.J. MEESE. 1984. Winter habitat selection of diurnal raptors in central Utah. *Raptor Res.* 18:98–102.

GESSAMAN, J.A. 1982. A survey of raptors in northern Utah, 1976–79. *Raptor Res.* 16:4–10.

HANEY, D.L. 1997. Population dynamics of wintering Merlins (*Falco columbarius*) in central Utah. M.S. thesis, Brigham Young University, Provo, UT U.S.A.

U.S. CENSUS BUREAU. 1996. U.S.A. counties 1996, Cache Valley, UT (49005), general profile. Washington, DC U.S.A.

WOFFINDEN, N.D. AND J.R. MURPHY. 1977. A roadside census in the Eastern Great Basin—1973–1974. *Raptor Res.* 11:62–66.

Received 25 February 1999; accepted 7 August 1999